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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/940,072	08/27/2001	Hong Yang	H0498/7155	3068

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EXAMINER

LOPEZ, CARLOS N

ART UNIT	PAPER NUMBER
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1731

DATE MAILED: 01/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/940,072	<b>Applicant(s)</b> YANG ET AL.5	
	<b>Examiner</b> Carlos Lopez	<b>Art Unit</b> 1731	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 29 October 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-4,6,7,9-38,50,52-55 and 57-59 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4,6,7,9-38,50,52-55 and 57-59 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4,6-7,9, 17-26, 30,37, and 57 are rejected under 35

U.S.C. 102(b) as being anticipated by Fain et al (US 5,340,515). Fain discloses a method of making ceramic structures using micro-molds (Abstract). The method comprises providing a mold having at least one dimension less than 100µm (See Col. 3, lines 55ff). The micro-mold is filled with a ceramic precursor such as  $\text{LiAlO}_2$  as disclosed in Example 1 or  $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$  as disclosed in Example 2 (See also Col. 4, lines 23ff). The micro-molds filled with the ceramic slurry are then heated in a non-oxidizing atmosphere to produce a ceramic structure (Col. 4, lines 23ff). In regards to the claimed limitation of heating in a moisture-free atmosphere, in a non-oxidizing atmosphere oxygen element is not present, hence water,  $\text{H}_2\text{O}$ , would also not be present in the heating atmosphere since it contains an oxygen element. Thus a non-oxidizing atmosphere reads on applicant's claimed moisture-free atmosphere.

As for claim 6, the ceramic structure is  $\text{LiAlO}_2$ , which is a ceramic precursor.

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As for claim 7, the heating step is done in an inert atmosphere, see col. 4, lines 65 or alternatively the term non-oxidizing atmosphere is used by Fain to also mean an inert atmosphere as shown in example 1.

As for claim 9 the viscosity of the ceramic slurry is sufficient to fill micro-mold tube having an inside diameter of at least 10 $\mu$ m.

As for claims 17-18, the mold is filled by capillary action, which would thus require the pressure of the volume of the mold being filled to have a lower pressure.

As for claim 19, 21 and 22, as noted above Fain discloses the first heating step is done in a non-oxidizing atmosphere may be initially done at a temperature of 100°C to 150°C to remove the slurry liquid (Col. 4, lines 45ff). It is this removal of the slurry liquid that is deemed as the claimed curing.

As for claims 23-24, the initially heating as noted above is done in a non-oxidizing atmosphere/inert atmosphere.

As for claim 25-26, the molded product is removed from the mold by burning off the mold (Col. 4, lines 49ff).

As for claim 30, as noted above the mold is removed by burning off the mold at a temperature of 1000°C to yield a ceramic product (See Col. 3, lines 18ff).

As for claims 37, as in Col. 3, lines 47ff, the mold is filled in an inert environment.

Claims 1-4,6-7,9, 11-22, 25-26, 30, 31, 32-38, 50, 53-55 and 59 are rejected under 35 U.S.C. 102(e) as being by Schueller et al (US 6,143,412).

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Schuller discloses fabricating of microstructures of carbon material tailored by ceramic additives (See Abstract and Col. 11, lines 45ff). The method comprises providing a micro-mold with dimensions less than 100 $\mu$ m (Col. 6, lines 47ff).

High carbon precursors, deemed as the claimed ceramic precursors, are used to fill the micro-mold (See Col. 4, lines 60ff and Col.6, lines 57ff). As noted in Col. 13, lines 4ff, the ceramic material precursor is cured at a temperature ranging from 80°C to 150 °C, after curing the cure precursor material is removed from the mold and heated in a deoxygenated argon atmosphere to form a high carbon structure (See Col.8, lines 9ff which teaches of optionally heating the ceramic precursor in the mold). The deoxygenated argon atmosphere is deemed as the claimed moisture free atmosphere.

As for claims 2-4, the ceramic precursor is furfuryl alcohol modified phenolic resin a composition that includes hydrogen, carbon, and nitrogen.

As for claim 7, argon is an inert element.

As for claims 9 and 17-18, it is inherent that ceramic precursor has sufficient viscosity in order to fill the mold via capillary as noted by Schuller in Col. 6, lines 1ff or by providing an area of low pressure when using vacuum.

As for claims 11-12, the micromole is treated with polymethyl siloxane, which is deemed as inert with respect to reaction with the ceramic precursor and subsequent products resulting from the ceramic precursor (Col. 7, lines 40ff).

As for claims 13-14, a substrate 30 is positioned against the surface of the micromole 20 to create a cavity as shown in figure 1 for which the ceramic precursor fills.

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As for claim 15, the substrate is treated with polymethyl siloxane, which is deemed as inert with respect to reaction with the ceramic precursor and subsequent products resulting from the ceramic precursor (Col. 7, lines 40ff).

As for claim 16, treating the micro-mold with polymethyl siloxane is deemed as silanization.

As for claim 19, see above.

As for claims 20-22, the precursor is both chemically cured by inducing polymerization and by thermal curing which as noted above the temperature is raised 80 °C to 150 °C.

As for claims 25-26, the mold is physically removed from the molded product (See col. 13, line 4)

As for claim 31 the product is transferred to silicon substrate to measure its resistance (Col. 13, lines 23ff).

As for claims 32-34, the precursor can be a single precursor as the noted above furfuryl alcohol modified phenolic resin or copolymers of furfuryl alcohol-phenol polymers (See Col. 8, lines 60ff).

As for claims 35-36 the mold is made of an elastomer of polymethyl siloxane (See Col. 7, lines 40ff).

As for claims 37-38, the filling of the molds can be made by applying a vacuum thus providing an inert and moisture free atmosphere while filling the molds.

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***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 27-29 and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schueller et al (US 6,143,412) as applied to claims 1 and 25 above and in view of Warren et al (US 4,250,127). The micro-molding process of Schueller can be used to make electron microscopy grids (see Abstract). Schueller is silent in the manner in which the mold is removed from the molded product.

Warren et al is directed to the formation of electron microscopy grids by using a micro-molding process (See Abstract). Warren teaches that removing grids formed by micro-molds by dissolving the mold with a substance that does not chemically attack the grids provides for extremely small micro-components that can be made inexpensively without damage or distortion (Col. 3, lines 23ff). As further noted by Warren in col. 4, lines 23ff, by dissolving the micro-mold, the stresses that would occur on the grids when using release agents and mechanical removal devices is eliminated.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have removed the micro-mold from the molded product of Schueller by dissolving the micro-mold as taught by Warren in

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order to eliminate stresses or distortion of the molded product when removing the molded product from the mold.

As for claims 28-29, the substance used to dissolve the micro-mold would depend on the type of micro-mold being used. It would be obvious to a person of ordinary skill in the art, at the time the invention was made to have used the appropriate substance that would dissolve the mold and not attack the molded product as taught by Warren. Hence the claimed fluoride substance is clearly envisaged by the general teachings of Warren. Routine experimentation may be conducted to arrive at the claimed fluoride substance that would dissolve the micro-mold and not attack the molded product. The type of substance used to dissolve the mold would depend on the type of mold being used. Applicant has merely found a substance that would the dissolve the mold being used by the applicant in accordance with the general teachings of Warren et al.

Claims 10 and 52, are rejected under 35 U.S.C. 103(a) as being unpatentable over Schueller et al (US 6,143,412) as applied to claims 1 and 9 above. Schueller is silent disclosing the viscosity of the ceramic precursor. However, since the filling of the micro-molds is done by capillary action or the application of a vacuum it is reasonably to infer from the teachings of Schueller that viscosity of the ceramic precursor should be sufficiently low, at the very least less than about  $500 \text{ cm}^2/\text{s}$ , to allow for capillary filling or vacuum filling of the micro-molds. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to conduct routine experiments that would



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determine the viscosity of the ceramic precursor that allows for the flowing of the precursor into the micro-molds by capillary action or by the application of a vacuum.

Claims 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fain et al (US 5,340,515) as applied to claims 1 and 9. Fain is silent disclosing the viscosity of the ceramic precursor. However, since the filling of the micro-molds is done by capillary action it is reasonably to infer from the teachings of Fain that viscosity of the ceramic precursor should be sufficiently, at the very least less than about  $500 \text{ cm}^2/\text{s}$ , low to allow for capillary filling of the micro-molds. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to conduct routine experiments that would determine the viscosity of the ceramic precursor that allows for the flowing of the precursor into the micro-molds by capillary action.

### ***Response to Arguments***

Applicant's argument with respect to the rejection of Fain in view of Younes has been considered but is moot in view of the new ground(s) of rejection.

### ***Conclusion***

References B-C in PTO-892 have been cited to show the state of the art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carlos Lopez whose telephone number is 571.272.1193. The examiner can normally be reached on Mon.-Fri. 8am - 5pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571.272.1189. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
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